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Document Number 26

Entry 26 of 36

File: USPT

Dec 14, 1982

DOCUMENT-IDENTIFIER: US 4363673 A

TITLE: Process for the removal of carbon from solid surfaces

BSPR:

The sulfur trioxide-containing fluid employed can be gaseous sulfur trioxide alone or as the active component in a fluid system (gas or liquid). The fluid should be one which conveys the sulfur trioxide to the surface to be cleaned in such a form to permit the sulfur trioxide to function in the present process. Preferably the fluid is substantially non-reactive with the sulfur trioxide. Examples of the fluid system include dry air, nitrogen and chlorinated solvents.

BSPR:

Preferably, contact of the solid surface with the sulfur trioxide containing fluid should be accomplished under essentially water-free conditions. If the solid surface is wet, the surface can be first dried, for example, by heating to elevated temperatures, to remove residual surface moisture. Preferably, the atmosphere around the contact area between the solid surface and sulfur trioxide-containing fluid should be essentially anhydrous. For example, if the contact is to be made in a container, the atmosphere within the container can be purged to reduce water vapor prior to contact of the sulfur trioxide gas with the solid surface.

BSPR:

After the surface has been contacted with the sulfur trioxide, it is flushed, swept or otherwise rinsed with a fluid (gas or liquid). Preferably, the rinse fluid is a water based liquid. The rinsing step can also be the first step in post treatment processing of the surface.

BSPR:

The examples described herein unless otherwise specified were conducted utilizing the following equipment. To provide a sulfur trioxide gas for contact with the solid surface, a sulfur trioxide vaporizer in a steam-heated bath was employed. Such vaporizer was connected to a four-liter stainless steel/glass treatment chamber into which samples of solids were placed to be treated. By heating the sulfur trioxide vaporizer and opening connecting lines into the four-liter chamber, SO.sub.3 vapors were transferred into the treatment chamber. Passivating solutions or water rinses were fed directly into the treatment chamber.

DETL:

TABLE VII SO.sub.3 in Chlorinated
Solvent - Cold Rolled Steel Weight Example No. Treatment % Carbon

| | Comparative | None | 97 | Comparative |
|--|-------------|--|-----------|---------------------------|
| Dipped and swirled in dis- | 50 | titled | methylene | chloride for 2 minutes at |
| room tem- | 24 | Dipped and swirled in solu- | 42 | tion of 10 weight % |
| <u>SO.sub.3</u> in distilled methylene chloride for 2 minutes at room tempera- | | | | |
| ture. Samples were rinsed with deionized water. | -25 | Dipped and swirled | | |
| in solu- | 25 | tion of 10 weight % <u>SO.sub.3</u> in 1,1,2,2-perchloroethylene | | |
| for 2 minutes at room temperature. Samples were rinsed with deion- | | | | |
| ized water. | 26 | Contacted with <u>SO.sub.3 gas</u> for 15 | 2 | minutes. Samples were |

rinsed with deionized water. _____

CCOR:

134/2

CCXR:

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|----------------|--------------------------------|------------------|-----------------|
| USPT | 17 and 19 | 36 | <u>L10</u> |
| USPT | 16 same gas | 3635 | <u>L9</u> |
| USPT | 17 and 16 | 195 | <u>L8</u> |
| USPT | 134/\$.ccls. | 24550 | <u>L7</u> |
| USPT | 12 or 13 or 14 or 15 | 30764 | <u>L6</u> |
| USPT | "so.sub.3" | 28211 | <u>L5</u> |
| USPT | sulfur trioxide | 5119 | <u>L4</u> |
| USPT | sulfurtrioxide | 80 | <u>L3</u> |
| USPT | sulphurtrioxide | 8 | <u>L2</u> |
| USPT | (semiconductor wafer cleaning) | 155 | <u>L1</u> |